Figure 1

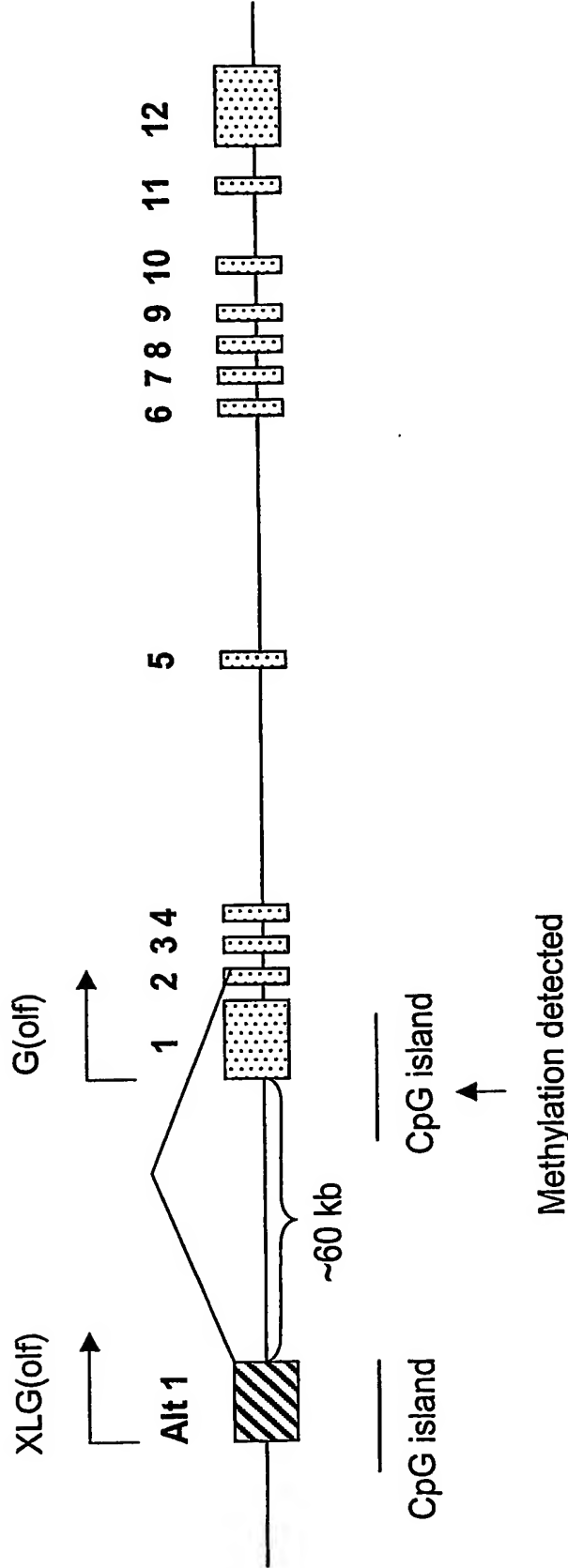**Figure 2**

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Figure 3

```
G(olf)      ------------------------------------------------------------
Galphas     ------------------------------------------------------------
XLG(olf)    --------MGLCYSLRPLLFGGPGDDPCAASEPPVEDAQPAPAPALAPVRAAARD
XLGalphas   TPRPTRASAWRGKSESSRGRRVYYDEGVASSDDDSSGDESDSDDGTSGCLRWFQHRRNRRRR
                                                                         .

G(olf)      -----------------------------------------MGCLGGNSKTTEDQGVDEKE
Galphas     ------------------------------------------MGCLGNSKTEDQRNEEKA
XLG(olf)    TARTLLPR-------GGEGSPACARPKADK--PKEKRQRTEQLSAEEREAAKEREAVKE
XLGalphas   KPQRNLLRNFLVQAFGGCFGRSESPQPKASRSLKVKKVPLAEKRRQMRKEALEKRAQKRA
              *  .                                                *

                             βγ subunit binding │          exon 2
G(olf)      RREANKKIEKQLQKERLAYKATHRLLLL GAGESGKSTIVKQMRILHVNGFNPE--E----
Galphas     QREANKKIEKQLQKDKQVYRATHRLLLL GAGESGKSTIVKQMRILHVNGFNGEGGEEDPQ
XLG(olf)    ARKVSRGIDRMLRDQKRDLQQTHRLLLL GAGESGKSTIVKQMRILHVNGFNPE--E----
XLGalphas   EKKRSKLIDKQLQDEKMGYMCTHRLLLL GAGESGKSTIVKQMRILHVNGFNGEGGEEDPQ
             * *.*.   * * .*.**          ********************* *

G(olf)      ------KKQKILDIRKNVKDAIVTIVSAMSTIIPPVPLANPENQFRSDYIKSIAPIT
Galphas     AARSNSDGEKATKVQDIKNNLKEAIETIVAAMSNLVPPVELANPENQFRVDYILSVMNVP
XLG(olf)    ------KKQKILDIRKNVKDAIVTIVSAMSTIIPPVPLANPENQFRSDYIKSIAPIT
XLGalphas   AARSNSDGEKATKVQDIKNNLKEAIETIVAAMSNLVPPVELANPENQFRVDYILSVMNVP
                  * .**  *.. ***.* ****  .. ****** *******  * .
```

Figure 4

A=A_{2A} Receptor   F=Golf   XL=XLGolf   BG=beta and gamma subunits

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Figure 5

Figure 6

T98G Glioma DNA Golf and XL Golf MSP
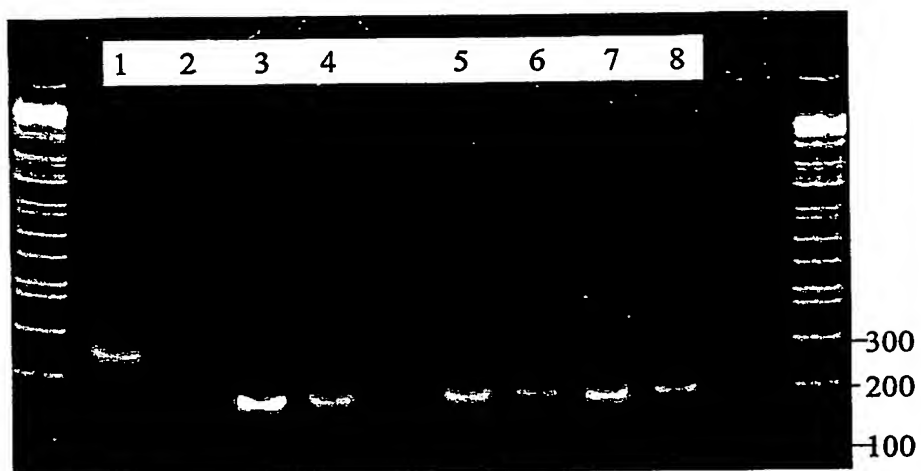
Figure 7

Peripheral Blood DNA Golf and XL Golf MSP

Figure 8

Human GNAL locus; 197140 nt

Features
```
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        CpG island                2118..2881
        Variation T/C             2198
        Variation A/G             2216
        Variation C/T             2268
        XLGolf start codon        2309
        Variation repeat          2421..2426
        Variation A/G             2445
        Variation repeat          2746..2765
        Variation C/T             2765
        CpG island                64253..65647
        Variation T/G             64734
        Variation C/T             64748
        Exon 1                    64925..65323
        Golf start codon          65179
        Exon 2                    65598..65670
        Exon 3                    66373..66427
        Exon 4                    66571..66690
        Exon 5                    137663..137760
        Exon 6                    175140..175194
        Exon 7                    177278..177351
        Exon 8                    179913..179971
        Exon 9                    181288..181408
        Exon 10                   185013..185143
        Exon 11                   189366..189433
        Exon 12                   193734..194571
        Stop codon                193878
```

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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```

Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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Fig. 8 (cont.)

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ttgaagcaac gacctttgta atgactccat tcccttaatt ttaaagctct agacagggac   191280
aaatagtcac actattacag aagaaagcct ttttagtttt gtttatttgg gacattgctt   191340
cacactgtca cccaggctgc ctggagtgca gtggcaagat cgtagctcac tgcagcctcc   191400
aactcctggg ctcaagcaac cctcctgcct cagcctcctg agtagctggg actacaggca   191460
cacaccaccg cacccggcta attttaaat tttatagaga tacagccttg ctatgttggc   191520
caggctggtc tcgaactcct cgcctcaagt gatcctcctg cctccaccte ccaaagtgct   191580
gggattacag gtgtgagcca ctgcacccag ccaaaagcct attttcatc cattcactac   191640
acacttactg tgtatgtgcc aaatacctca cctggtgctt tgggattaaa aagatatata   191700
actggttgga ggagtgggga gggatagcat taggagatac acctaatgta aatgacgagt   191760
taatgggtgc agcacaccaa catggcacat gtatacatat gtaacaaacc tgcacgttgt   191820
gcacatgtat cctagaactt acagtataat aaaatatata tatattaaaa atatatatat   191880
```

```
ataacctact cattttagtg tccataagtt ttttttttaa tgctcaagag aagcctgact    191940
attgctaaaa taggtctatc cccgtgagga gtttcatacc tcatgacatc tttaggatac    192000
cctttctgtg gtccaagcag ctctctaaag gctgtttccc aggatcgaaa aaggagtgga    192060
ggggatgagg aggaggccca gggattctcg tggcaccaag gaagaaggtg agcttccaca    192120
ggacctctgt ctaagtctgc ccgggctgcc ataacaaagt gccgcagagg ctgagtgtct    192180
taaacagcag aaatgtattt ctcacagctc tggaggctgg aagtctgaaa tcaaggtgcg    192240
gggtcttccc tcgcacatgg ctgcatcctc ctggtttcct cttctctcta ggacaccagt    192300
catattgcat tagggcccac cctaatgacc tcattttacc gtaattgcct ctgtaaaggc    192360
cttatctcca aatatagtca catctgaggt gccagtcgtc agggattcca cacaacttca    192420
gggaacacaa tttggcccta acagcctgtc cccacaccca ctgcacttag cttcatagtg    192480
cacattagca catcactgag gtggtcccca caaaccatga ttcgtaatgt ctaaccctgt    192540
ttctcaggta cttgataaca gatcactttt ctcccagaag gcagcaaacg ttcccccgat    192600
aaccagggga caccctgctt agcagatgct aaactgcccc tgtgtggagg ccgccaccgg    192660
gccgctgcac cgtccagtac agaaccactg ggcacatatg gacatttaat taaaactagc    192720
tggccgggcg cggtggctca cgcctgtaat cccagcactt tgggaggccg aggcaggcgg    192780
atcatgaggt caggagttca agaccagcct gaccaacatg gtgaaacccc gtctctacta    192840
aaaatacaaa aagtagccag gcgtggtggc gcacgcctgt aatcccagct actcaggagg    192900
ctgaggcagg agaattgctt gaacccggga ggcagaggtt gcagtgagcc gagatggcac    192960
cactgcactc cagcctgggg gacacagcga gactccatct caaacaaaca aaaaaacaaa    193020
caagctaatt aggtggggca cagtggctca tgcctataat cccagcactt tgggaggccg    193080
aggtgggcgg atcacttgag gtcaggagtt tgagaccagc ctggccaaca tggtgacacc    193140
ccgtctctac taaaaataca aaaattagcc aggcgtgggc acggtgatgg acgcctgtaa    193200
tctcagccac ttgagaggct gaggcaggag aatcccttga acctgggagg tggaggttgc    193260
agtgagccaa gactgcacca ctgcactcca gcctgggcaa cagagctaga ctcagtctca    193320
aaaatatata aataaacaaa caaaataaaa ttagctaatt agaaatcagc cccttggtgg    193380
tatcagctag atagcgacta tcatattggc agggcagata gtggacattc ccattgtcac    193440
agaaaactct gttcagacct tccttttttgg aagctcctcc cttgacttgc ctgccgggggc    193500
tttctctgac ctatccgtgc tgcttcagcc tcctgggggc aatgataagg gtgaggttat    193560
ctgggtcctc ggccgatgct tgcattgaga ccattcctgc ctctaagtgc tcccatgcaa    193620
aacaagcagg ccactgtcac caaagcctcc agcacctgct cagcgtggcc tagtccttcc    193680
ccagagtaca tgctgggggcc gcgcagggct agtgcacacg ctctctcttg cagaggatca    193740
gcacggccac cggtgacggc aaacattact gctacccgca cttcacctgc gccgtggaca    193800
cagagaacat ccgcagggtg ttcaacgact gccgcgacat catccagcgg atgcacctca    193860
agcagtatga gctcttgtga ggatgctgcc gccaccctgc gacggagcgg cgccccggac    193920
tgcctgactg ccagccccat gccatggtag gaggcagagt ctctagttcc atctcgctgc    193980
cgtctgtccc gttctgtgtc gaccaccaag cctctggcta cctctgtccc ctcaggtttg    194040
gttgtgtagc ttctgttgtc attgaatacg gcctcccgca gcatcccacc cccaaaccac    194100
cgactctcat tgccgacact gcagcagaat ctctccgggt gggagcccca ttattcattc    194160
tccctttatt gattcatcga ggagaacttg gtagatgggg agaaaacaca gttggttttt    194220
ttttccacgt tatcaaccgt gactgcaaga gcgttcgtgc agtgccctga gccacggccg    194280
tctctgattc tcccttttatg aagctgcagg ctgacgagag atggtccctt cccattggcc    194340
ttagcccaag acttggagtc gaccccaagc gacagagtga ccagaaaccc ttttacagtc    194400
acattcagag tcgctgctgg cctcaggcat ttgaattaga gctactttga gcctcttagg    194460
cagaaaacct accacattca ctactgcaaa atgtgtcctg tctaaaaatg attctctaaa    194520
ctttccctat acttaggcat agtcttcttt cttagattct ctttgttgtt gtccctattg    194580
ctggtttatt acactgtaca gaccacaaaa tgtaatattc ttttgtataa ctactaaaga    194640
aaaatccttg tagatctttg tgccttcacc atggctatct atacctgtac atgaaatgtg    194700
tttgtattgt gctgaagagc ttaatgtcaa cattacctgc tgcttactct gaaaaaagga    194760
atgaatggta gctgtagaat ttaggatatt ttatcaggtt ggcactttat aaaatactcc    194820
ctgatttaaa aaattgtaag ttatacacgt taatcatcca cattctatcg acaatgtacc    194880
aacatcacaa gctgttgcaa ccacctgctg ttacttctct gagctgtaaa aacctgaact    194940
caattcaggg gtacaaattg caatctaatc ttttcaggga accagggatt tttttctctc    195000
tctctagaca atatgtttcc tcattagtct gctaatgaaa cacttcttca agttccccaa    195060
gtgggaacag gtccatcatt cccttagtca aaactttgga cacaggctac gtcatacaag    195120
taagcaaaca gtaagagaaa aacaaaatgt ggccaggcgc ggtggctcac gcctgtaatc    195180
ccagcacttt gggaggccga ggcaggcgga tcacgaggcc aggagatcaa gaccatcctg    195240
gctaacatgg cgaaaccctg tctctaccaa aaatacaaaa attagccagg cgtggtggcg    195300
ggcacctgta atctcagcta ctcgagaggc tgaggcagga gaatctcttg aacctgggag    195360
gtggagattg cagtgagccg aggtcgtgcc atcgcactcc agcctggaca tcaaagtgag    195420
actcaggcca aaaaaaaaaa aaaaaaaaac cttgacgtgt caatgtttgt gtctggccta    195480
ggagaatgag gatgacagct tcacttgcct tttgaagaag aaacattaca aaaccttaat    195540
```

Fig. 8 (cont.)

```
ctgaagtata aagtcaaaag atacggctct ttctcacact tgcaagactt acaaatacag   195600
cctcaaacat tatgacacac caacaatatc tagaaagtaa gaactggtgt agcaatgatg   195660
cttcatattc tagctgtagc cacagagttg agggtagttt ttgtaggtct aaaataataa   195720
tctataaaga tgtccaaagt taaattttca acaatacaaa tctagagaag tgacagccta   195780
cattacttca ttattactct tcttttagtc tttagtcttt aatattttaa agtttactct   195840
ataaatcagc attttgtaat cctttataaa ctcatccaga tttaaatgct acttttttcat  195900
gaagaaagga taactttata gacagtcagt gcaacacaca cattttatct catcaccgtc   195960
ttactgcctc cccatccact gtctcataaa gccctcagct gaactaagat aaataataca   196020
atggaaatta ttttcagttc cccttgcact gtcaaagtaa aacaagaaaa ctgaaaagct   196080
gcacccccag caagaaaggg aagtatgctg ttgtatgcat cattactcaa caattaccct   196140
ctaactaaac atcctgttta agagtttaat tcaaacaaca gccagactgt taagaaaaaa   196200
aacaaaaaga ataactttta tctggcttac aattattaaa gcatttattt tcaggtacca   196260
aaagccatat cccattccac ttttttaagtt tcttttgatc actgacaggc attaacagat  196320
gtagcaacgt ggtctcctat agagaaaatt acacttatct aaaaatctga ttccattaat   196380
tgatcaagta taaaaatcta cgaaaacaat atgttctgca catcacatct gtactttttt   196440
ttttttaaat atattttttg agacggagtc tcactctgtt gcccaggctg gagtgcagtg   196500
gcatgatctt ggctcactgc aacctccgcc tcccgggctc aagggattct cctgcctcag   196560
cctcagctgg tattataggc acttgctacc atgcttggct aattttttgta tttctagcgg   196620
agacgaggtt tcaccatgtt ggccaggctg gtcttgaact cctgacctca agtgatccac   196680
ccgcctcagc ctcccaaagt gctgggatta caggtgtgag ccactgtgcc cggccacatc   196740
tgtacttta agggtacagc tttacagtac ataggaattt gagaaccact tcacaggaag   196800
agggaaacag cccaatattt atttatgtat acacataatc ccaagtgtgt gctggggcca   196860
ccaggccctt cctgggggaa caaggactgt cgtgcatgtg agtgacgaca ttaatagcat   196920
ttacatactg tacagatgca acctttgatg atacatatat ttgataaaaa tgagaaaaca   196980
gatttgttgt agagtacctg tccactttta tagcatgaga acagtacaat caactatta   197040
ttttgcagtt actcatttca gtgattgaga atttctgtgc tgtgcagaga gacggcctgt   197100
aattggtctc atcatccact tgattctaac atgatctctg                         197140
```

Figure 9

Amino Acid Sequence of Human Golf

```
  1 MGCLGGNSKT TEDQGVDEKE RREANKKIEK QLQKERLAYK ATHRLLLLGA GESGKSTIVK
 61 QMRILHVNGF NPEEKKQKIL DIRKNVKDAI VTIVSAMSTI IPPVPLANPE NQFRSDYIKS
121 IAPITDFEYS QEFFDHVKKL WDDEGVKACF ERSNEYQLID CAQYFLERID SVSLVDYTPT
181 DQDLLRCRVL TSGIFETRFQ VDKVNFHMFD VGGQRDERRK WIQCFNDVTA IIYVAACSSY
241 NMVIREDNNT NRLRESLDLF ESIWNNRWLR TISIILFLNK QDMLAEKVLA GKSKIEDYFP
301 EYANYTVPED ATPDAGEDPK VTRAKFFIRD LFLRISTATG DGKHYCYPHF TCAVDTENIR
361 RVFNDCRDII QRMHLKQYEL L
```

Figure 10

cDNA and Amino Acid Sequence of Human XLGolf

```
        M   G   L   C   Y   S   L   R   P   L   L   F   G   G   P   G   D   D   P   C
   1    ATGGGTCTGTGCTACAGTCTGCGGCCGCTGCTTTTCGGGGGGCCCAGGGGACGACCCCTGC
        A   A   S   E   P   P   V   E   D   A   Q   P   A   P   A   P   A   L   A   P
  61    GCGGCCTCGGAGCCGCCGGTGGAGGACGCGCAGCCCGCCCCGGCCCCGGCCCTGGCCCCA
        V   R   A   A   A   R   D   T   A   R   T   L   L   P   R   G   G   E   G   S
 121    GTCCGGGCGGCCGCAAGGGACACGGCCCGGACCCTGCTCCCTCGGGGCGGCGAAGGGAGC
        P   A   C   A   R   P   K   A   D   K   P   K   E   K   R   Q   R   T   E   Q
 181    CCGGCATGCGCTCGGCCCAAAGCAGACAAGCCGAAGGAGAAGCGGCAGCGCACCGAGCAG
        L   S   A   E   E   R   E   A   A   K   E   R   E   A   V   K   E   A   R   K
 241    CTGAGTGCCGAGGAGCGCGAGGCGGCCAAGGAGCGCGAGGCGGTCAAGGAGGCGAGGAAA
        V   S   R   G   I   D   R   M   L   R   D   Q   K   R   D   L   Q   Q   T   H
 301    GTGAGCCGGGGCATCGACCGCATGCTGCGCGACCAGAAGCGCGACCTGCAGCAGACGCAC
        R · L   L   L   L   G   A   G   E   S   G   K   S   T   I   V   K   Q   M   R
 361    CGGCTCCTGCTGCTCGGGGCTGGTGAGTCTGGGAAAAGCACCATCGTCAAACAGATGAGG
        I · L   H   V   N   G   F   N   P   E   E   K   Q   K   I   L   D   I   R
 421    ATCCTGCACGTCAATGGGTTTAATCCCGAGGAAAAGAAACAGAAAATTCTGGACATCCGG
        K   N   V   K   D   A   I   V   T   I   V   S   A   M   S   T   I   I   P   P
 481    AAAAATGTTAAAGATGCTATCGTGACAATTGTTTCAGCAATGAGTACTATAATACCTCCA
        V   P   L   A   N   P   E   N   Q   F   R   S   D   Y   I   K   S   I   A   P
 541    GTTCCGCTGGCCAACCCTGAAAACCAATTTCGATCAGACTACATCAAGAGCATAGCCCCT
        I   T   D   F   E   Y   S   Q   E   F   F   D   H   V   K   K   L   W   D   D
 601    ATCACTGACTTTGAATATTCCCAGGAATTCTTTGACCATGTGAAAAAACTTTGGGACGAT
        E · G   V   K   A   C   F   E   R   S   N   E   Y   Q   L   I   D   C   A   Q
 661    GAAGGCGTGAAGGCATGCTTTGAGAGATCCAACGAATACCAGCTGATTGACTGTGCACAA
        · Y   F   L   E   R   I   D·  S   V   S   L   V   D   Y   T   P   T   D   Q   D
 721    TACTTCCTGGAAAGAATCGACAGCGTCAGCTTGGTTGACTACACACCCACAGACCAGGAC
        L   L   R   C   R   V   L   T   S   G   I   F   E   T   R   F   Q   V   D   K
 781    CTCCTCAGATGCAGAGTTCTGACATCTGGGATTTTTGAGACACGATTCCAAGTGGACAAA
        V   N   F   H   M   F   D   V   G   G   Q · R   D   E   R   R   K   W   I   Q
 841    GTAAACTTCCACATGTTTGATGTTGGTGGCCAGAGGGATGAGAGGAGAAAATGGATCCAG
        C   F   N   D   V   T   A   I   I   Y   V   A   A   C   S   S   Y   N   M   V
 901    TGCTTTAACGATGTCACAGCTATCATTTACGTCGCAGCCTGCAGTAGCTACAACATGGTG
        I   R·  E   D   N   N   T   N   R   L   R   E   S   L   D   L   F   E   S   I
 961    ATTCGAGAAGATAACAACACCAACAGGCTGAGAGAGTCCCTGGATCTTTTTGAAAGCATC
        W   N   N   R   W   L   R   T   I   S   I   I   L   F   L   N   K   Q   D   M
1021    TGGAACAACAGGTGGTTACGGACCATTTCTATCATCTTGTTCTTGAACAAACAAGATATG
        L   A   E   K   V   L   A   G   K   S   K   I   E   D   Y   F   P   E   Y   A
1081    CTGGCAGAAAAAGTCTTGGCAGGGAAATCAAAAATTGAAGACTATTTCCCAGAATATGCA
        N   Y   T   V   P   E   D   A   T   P   D   A   G   E   D   P   K   V   T   R
1141    AATTATACTGTTCCTGAAGACGCAACACCAGATGCAGGAGAAGATCCCAAAGTTACAAGA
        A   K   F   F   I   R   D   L   F   L   R   I   S   T   A   T   G   D   G   K
1201    GCCAAGTTCTTTATCCGGGACCTGTTTTTGAGGATCAGCACGGCCACCGGTGACGGCAAA
        H   Y   C   Y   P   H   F   T   C   A   V   D   T   E   N   I   R   R   V   F
1261    CATTACTGCTACCCGCACTTCACCTGCGCCGTGGACACAGAGAACATCCGCAGGGTGTTC
        N   D   C   R   D   I   I   Q   R   M   H   L   K   Q   Y   E   L   L   *
1321    AACGACTGCCGCGACATCATCCAGCGGATGCACCTCAAGCAGTATGAGCTCTTGTGA
```

Figure 11

```
G_olf    ---------------------------------------------------------------
G_αs     ---------------------------------------------------------------
XLG_olf  ---------------------------------------------------------------
XLG_αs   MEISGPPFEIGSAPAGVDDTPVNMDSPPIALDGPPIKVSGAPDKRERAERPPVEEEAAEM


G_olf    ---------------------------------------------------------------
G_αs     ---------------------------------------------------------------
XLG_olf  ---------------------------------------------------------------
XLG_αs   EGAADAAEGGKVPSPGYGSPAAGAASADTAARAAPAAPADPDSGATPEDPDSGTAPADPD


G_olf    ---------------------------------------------------------------
G_αs     ---------------------------------------------------------------
XLG_olf  ---------------------------------------------------------------
XLG_αs   SGAFAADPDSGAAPAAPADPDSGAAPDAPADPDSGAAPDAPADPDAGAAPEAPAAPAAAE


G_olf    ---------------------------------------------------------------
G_αs     ---------------------------------------------------------------
XLG_olf  ---------------------------------------------------------------
XLG_αs   TRAAHVAPAAPDAGAPTAPAASATRAAQVRRAASAAPASGARRKIHLRPPSPEIQAADPP


G_olf    ---------------------------------------------------------------
G_αs     ---------------------------------------------------------------
XLG_olf  --------------------------MGLCYSLRPLLFGGPGDDPCAASEPPVEDAQPAPAPA
XLG_αs   TPRPTRASAWRGKSESSRGRRVYYDEGVASSDDDSSGDESDDGTSGCLRWFQHRRNRRRR


G_olf    ------------------------------------------------MGCLGGNSKTTEDQGVDEKE
G_αs     ------------------------------------------------MGCLG-NSKT-EDQRNEEKA
XLG_olf  LAPVRAAARDTARTLLPRGGEGSPACARPKADKPKEKRQRTEQLSAEEREAAKEREAVKE
XLG_αs   KPQRNLLRNFLVQAFGGCFGRSESPQPKASRSLKVKKVPLAEKRRQMRKEALEKRAQKRA


         βγ binding domain
G_olf    RREANKKIEKQLQKERLAYKATHRLLLLGAGESGKSTIVKQMRILHVNGFNPE
G_αs     QREANKKIEKQLQKDKQVYRATHRLLLLGAGESGKSTIVKQMRILHVNGFNGE
XLG_olf  ARKVSRGIDRMLRDQKRDLQQTHRLLLLGAGESGKSTIVKQMRILHVNGFNPE
XLG_αs   EKKRSKLIDKQLQDEKMGYMCTHRLLLLGAGESGKSTIVKQMRILHVNGFNGE
         .    . *.. *.   .    ****************************** ** *
```

Figure 12

```
                1                                                    50
G(olf)          ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~
XL-G(olf)       atgggtctgt gctacagtct gcggccgctg cttttcgggg gcccagggga

                51                                                  100
G(olf)          ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~
XL-G(olf)       cgacccctgc gcggcctcgg agccgccggt ggaggacgcg cagcccgccc

                101                                                 150
G(olf)          ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~
XL-G(olf)       cggccccggc cctggcccca gtccgggcgg ccgcaaggga cacggcccgg

                151                                                 200
G(olf)          ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~
XL-G(olf)       accctgctcc ctcggggcgg cgaagggagc ccggcatgcg ctcggcccaa

                201                                                 250
G(olf)          ~~~~~~~~~~ ~~~~~~~~~~ ~~~~~~~~~~ ~AtgGgGtgt tTGgGcGgCa
XL-G(olf)       agcagacaag ccgaaggaga agcggcagcg cAccGaGcag cTGaGtGcCg

                251                                                 300
G(olf)          Acagcaagac GaCGGaagAc cAGgGCGtcG atGaaAAaGA acgacGcgAg
XL-G(olf)       Aggagcgcga GgCGGccaAg gAGcGCGagG cgGtcAAgGA ggcgaGgaAa

                301                                                 350
G(olf)          GccAaCaaaa agATCGAgaa gcaGtTGCag aAagAGcgcC tgGcttacaA
XL-G(olf)       GtgAgCcggg gcATCGAccg catGcTGCgc gAccAGaagC gcGacctgcA

                351                                                 400
G(olf)          GggtACcCAC CGcCTaCTGC TcCTgGGGGC TGGTGAGTCT GGGAAAAGCA
XL-G(olf)       GcagACgCAC CGgCTcCTGC TgCTcGGGGC TGGTGAGTCT GGGAAAAGCA

                401                                                 450
G(olf)          CTATCGTCAA ACAGATGAGG ATCCTGCACG TCAATGGGTT TAATCCCGAG
XL-G(olf)       CTATCGTCAA ACAGATGAGG ATCCTGCACG TCAATGGGTT TAATCCCGAG

                451                                                 500
G(olf)          GAAAAGAAAC AGAAAATTCT GGACATCCGG AAAAATGTTA AAGATGCTAT
XL-G(olf)       GAAAAGAAAC AGAAAATTCT GGACATCCGG AAAAATGTTA AAGATGCTAT

                501                                                 550
G(olf)          CGTGACAATT GTTTCAGCAA TGAGTACTAT AATACCTCCA GTTCCGCTGG
XL-G(olf)       CGTGACAATT GTTTCAGCAA TGAGTACTAT AATACCTCCA GTTCCGCTGG

                551                                                 600
G(olf)          CCAACCCTGA AAACCAATTT CGATCAGACT ACATCAAGAG CATAGCCCCT
XL-G(olf)       CCAACCCTGA AAACCAATTT CGATCAGACT ACATCAAGAG CATAGCCCCT

                601                                                 650
G(olf)          ATCACTGACT TTGAATATTC CCAGGAATTC TTTGACCATG TGAAAAAACT
XL-G(olf)       ATCACTGACT TTGAATATTC CCAGGAATTC TTTGACCATG TGAAAAAACT

                651                                                 700
G(olf)          TTGGGACGAT GAAGGCGTGA AGGCATGCTT TGAGAGATCC AACGAATACC
XL-G(olf)       TTGGGACGAT GAAGGCGTGA AGGCATGCTT TGAGAGATCC AACGAATACC

                701                                                 750
G(olf)          AGCTGATTGA CTGTGCACAA TACTTCCTGG AAAGAATCGA CAGCGTCAGC
XL-G(olf)       AGCTGATTGA CTGTGCACAA TACTTCCTGG AAAGAATCGA CAGCGTCAGC

                751                                                 800
G(olf)          TTGGTTGACT ACACACCCAC AGACCAGGAC CTCCTCAGAT GCAGAGTTCT
XL-G(olf)       TTGGTTGACT ACACACCCAC AGACCAGGAC CTCCTCAGAT GCAGAGTTCT

                801                                                 850
G(olf)          GACATCTGGG ATTTTTGAGA CACGATTCCA AGTGGACAAA GTAAACTTCC
XL-G(olf)       GACATCTGGG ATTTTTGAGA CACGATTCCA AGTGGACAAA GTAAACTTCC

                851                                                 900
G(olf)          ACATGTTTGA TGTTGGTGGC CAGAGGGATG AGAGGAGAAA ATGGATCCAG
XL-G(olf)       ACATGTTTGA TGTTGGTGGC CAGAGGGATG AGAGGAGAAA ATGGATCCAG

                901                                                 950
G(olf)          TGCTTTAACG ATGTCACAGC TATCATTTAC GTCGCAGCCT GCAGTAGCTA
XL-G(olf)       TGCTTTAACG ATGTCACAGC TATCATTTAC GTCGCAGCCT GCAGTAGCTA

                951                                                1000
G(olf)          CAACATGGTG ATTCGAGAAG ATAACAACAC CAACAGGCTG AGAGAGTCCC
XL-G(olf)       CAACATGGTG ATTCGAGAAG ATAACAACAC CAACAGGCTG AGAGAGTCCC
```

Fig. 12 (cont.)

```
              1001                                                    1050
   G(olf)     TGGATCTTTT TGAAAGCATC TGGAACAACA GGTGGTTACG GACCATTTCT
XL-G(olf)     TGGATCTTTT TGAAAGCATC TGGAACAACA GGTGGTTACG GACCATTTCT

              1051                                                    1100
   G(olf)     ATCATCTTGT TCTTGAACAA ACAAGATATG CTGGCAGAAA AAGTCTTGGC
XL-G(olf)     ATCATCTTGT TCTTGAACAA ACAAGATATG CTGGCAGAAA AAGTCTTGGC

              1101                                                    1150
   G(olf)     AGGGAAATCA AAAATTGAAG ACTATTTCCC AGAATATGCA AATTATACTG
XL-G(olf)     AGGGAAATCA AAAATTGAAG ACTATTTCCC AGAATATGCA AATTATACTG

              1151                                                    1200
   G(olf)     TTCCTGAAGA CGCAACACCA GATGCAGGAG AAGAtCCCAA AGTTACAAGA
XL-G(olf)     TTCCTGAAGA CGCAACACCA GATGCAGGAG AAGAcCCCAA AGTTACAAGA

              1201                                                    1250
   G(olf)     GCCAAGTTCT TTATCCGGGA CCTGTTTTTG AGGATCAGCA CGGCCACCGG
XL-G(olf)     GCCAAGTTCT TTATCCGGGA CCTGTTTTTG AGGATCAGCA CGGCCACCGG

              1251                                                    1300
   G(olf)     TGACGGCAAA CATTACTGCT ACCCGCACTT CACCTGCGCC GTGGACACAG
XL-G(olf)     TGACGGCAAA CATTACTGCT ACCCGCACTT CACCTGCGCC GTGGACACAG

              1301                                                    1350
   G(olf)     AGAACATCCG CAGGGTGTTC AACGACTGCC GCGACATCAT CCAGCGGATG
XL-G(olf)     AGAACATCCG CAGGGTGTTC AACGACTGCC GCGACATCAT CCAGCGGATG

              1351                1377
   G(olf)     CACCTCAAGC AGTATGAGCT CTTGTGA
XL-G(olf)     CACCTCAAGC AGTATGAGCT CTTGTGA
```

Figure 13

```
                        1                                                             50
        G(olf)          ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~
     xl-G(olf)          mglcyslrpl  lfggpgddpc  aaseppveda  qpapapalap  vraaardtar

                        51                                                            100
        G(olf)          ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~mgc  Lqqnsktted  qqvdeKErRe
     xl-G(olf)          tllprggegs  pacarpkadk  pkekrqrteq  Lsaeereaak  ereavKEaRk

                        101                                                           150
        G(olf)          ankkIekqLq  kerlaykaTH  RLLLLGAGES  GKSTIVKQMR  ILHVNGFNPE
     xl-G(olf)          vsrgIdrmLr  dqkrdlqqTH  RLLLLGAGES  GKSTIVKQMR  ILHVNGFNPE

                        151                                                           200
        G(olf)          EKKQKILDIR  KNVKDAIVTI  VSAMSTIIPP  VPLANPENQF  RSDYIKSIAP
     xl-G(olf)          EKKQKILDIR  KNVKDAIVTI  VSAMSTIIPP  VPLANPENQF  RSDYIKSIAP

                        201                                                           250
        G(olf)          ITDFEYSQEF  FDHVKKLWDD  EGVKACFERS  NEYQLIDCAQ  YFLERIDSVS
     xl-G(olf)          ITDFEYSQEF  FDHVKKLWDD  EGVKACFERS  NEYQLIDCAQ  YFLERIDSVS

                        251                                                           300
        G(olf)          LVDYTPTDQD  LLRCRVLTSG  IFETRFQVDK  VNFHMFDVGG  QRDERRKWIQ
     xl-G(olf)          LVDYTPTDQD  LLRCRVLTSG  IFETRFQVDK  VNFHMFDVGG  QRDERRKWIQ

                        301                                                           350
        G(olf)          CFNDVTAIIY  VAACSSYNMV  IREDNNTNRL  RESLDLFESI  WNNRWLRTIS
     xl-G(olf)          CFNDVTAIIY  VAACSSYNMV  IREDNNTNRL  RESLDLFESI  WNNRWLRTIS

                        351                                                           400
        G(olf)          IILFLNKQDM  LAEKVLAGKS  KIEDYFPEYA  NYTVPEDATP  DAGEDPKVTR
     xl-G(olf)          IILFLNKQDM  LAEKVLAGKS  KIEDYFPEYA  NYTVPEDATP  DAGEDPKVTR

                        401                                                           450
        G(olf)          AKFFIRDLFL  RISTATGDGK  HYCYPHFTCA  VDTENIRRVF  NDCRDIIQRM
     xl-G(olf)          AKFFIRDLFL  RISTATGDGK  HYCYPHFTCA  VDTENIRRVF  NDCRDIIQRM

                        451
        G(olf)          HLKQYELL
     xl-G(olf)          HLKQYELL
```
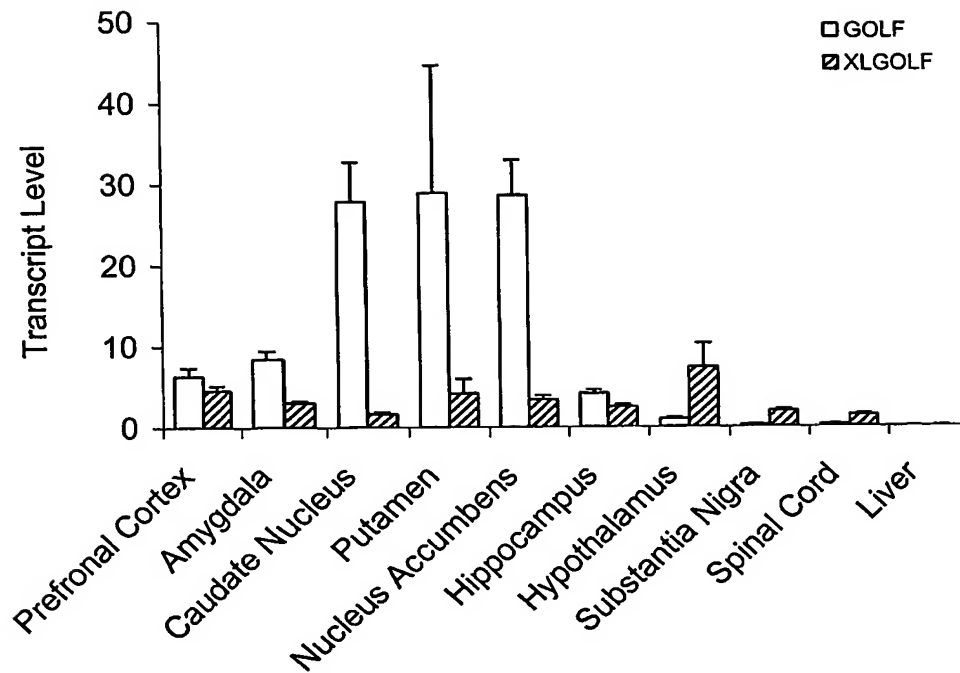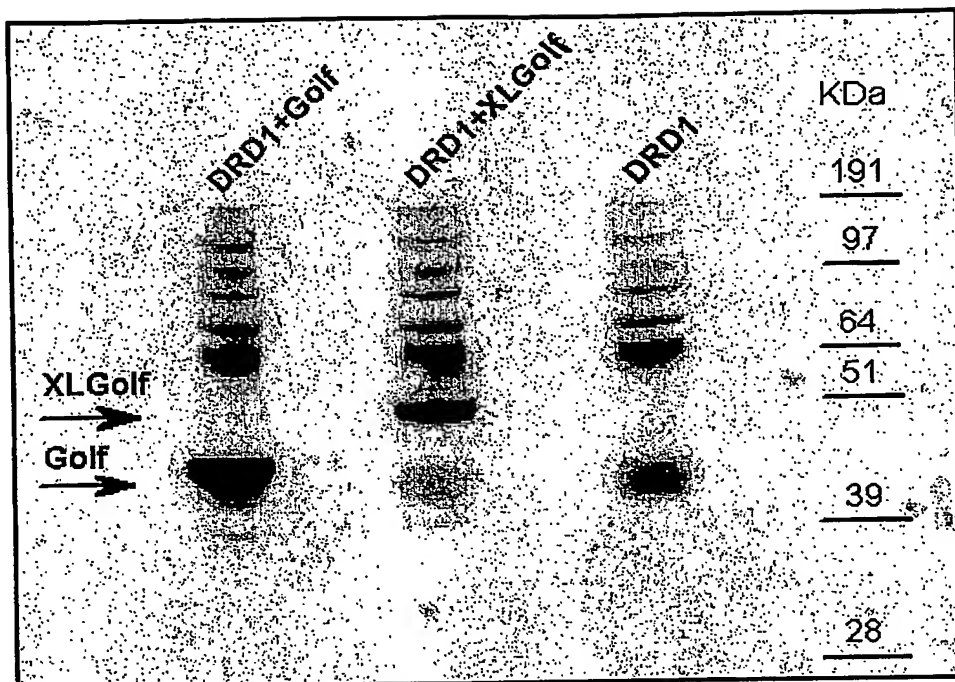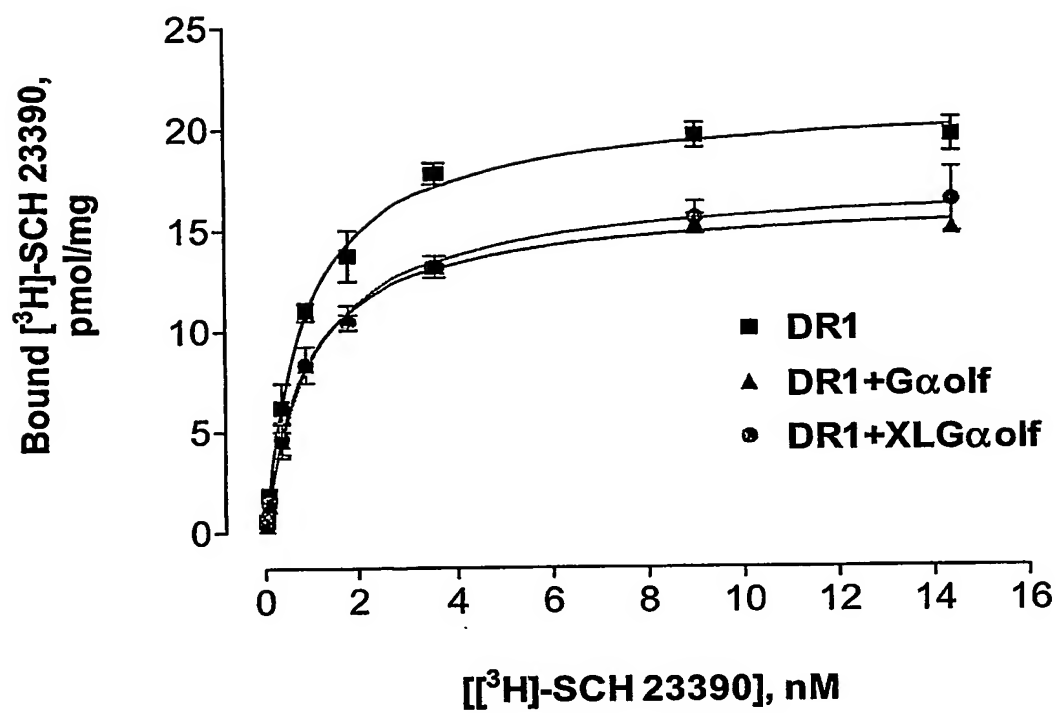
Figure 14

SUBSTITUTE SHEET (RULE 26)

Figure 15

Figure 16

Figure 17

SUBSTITUTE SHEET (RULE 26)
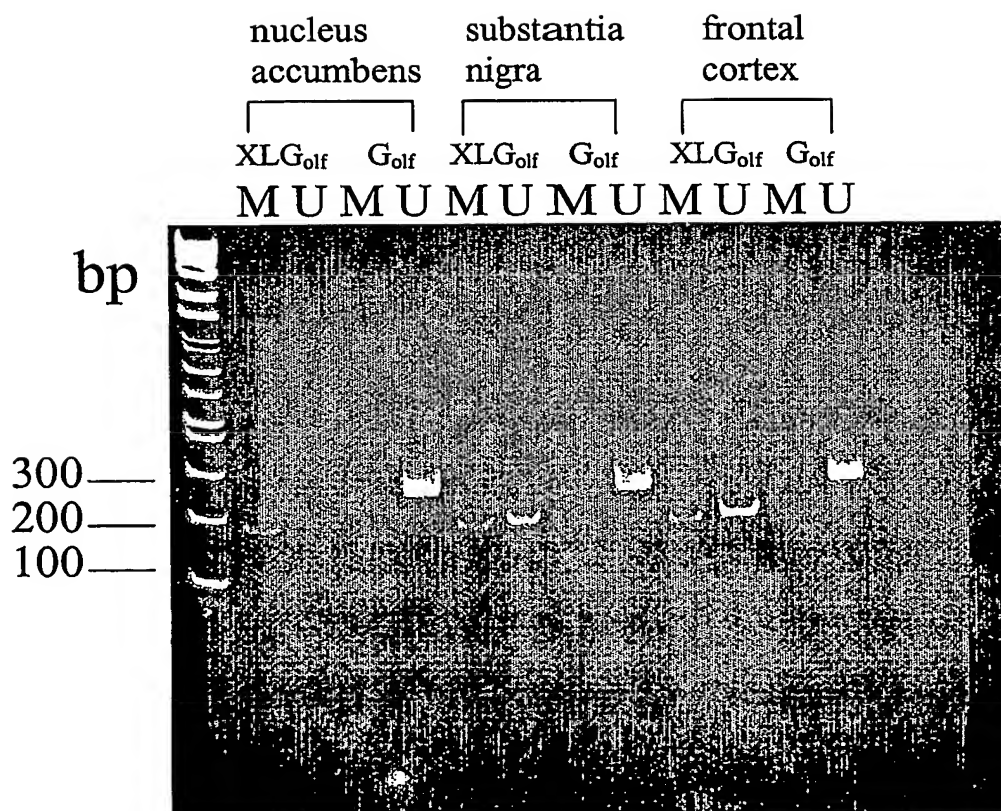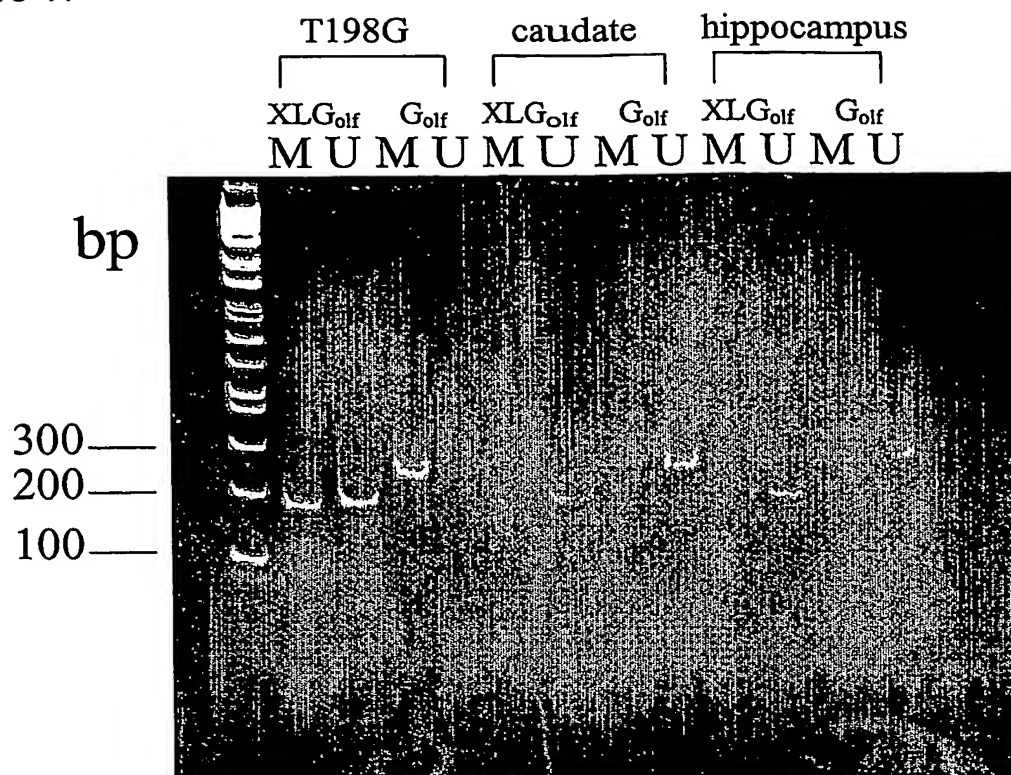
Figure 18
Mouse XLGolf cDNA

```
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atgagttaattctaagtgcactggaactttctctgtgaaggtgaaactcacaataaagctgt
tgttgtataagaagaataaaataattattttcagg
```

Figure 19

Mouse XLGolf Protein

MGLCYSLRPLLFGSPEDTPCAASEPCAEDAQPSAAPAPASIPAPAPVGTLLRRGGGRIVANARPPGELQS
RRRQEQLRAEEREAAKEARKVSRGIDRMLREQKRDLQQTHRLLLLGAGESGKSTIVKQMRILHVNGFN
PEEKKQKILDIRKNVKDAIVTIVSAMSTIIPPVPLANPENQFRSDYIKSIAPITDFEYSQEFFDHVKKLWDD
EGVKACFERSNEYQLIDCAQ